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ABSTRACT

Several recently published books on simulation and games are briefly discussed. Selected research studies and demonstration projects are examined to show the potential of simulation and gaming for teaching and training and for the study of social and psychological processes. The bibliography lists 113 publications which should lead the reader to practical information on games. (Author)

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AUGUST, 1971
SIMULATION GAMES: PRACTICAL REFERENCES, POTENTIAL USE, SELECTED BIBLIOGRAPHY,
STEVEN J. KIDDER

The Johns Hopkins University

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The Johns Hopkins University

Baltimore, Maryland

INTRODUCTORY STATEMENT

The Center for Social Organization of Schools has two primary objectives: to develop a scientific knowledge of how schools affect their students, and to use this knowledge to develop better school practices and organization.

The Center works through five programs to achieve its objectives. The Academic Games program has developed simulation games for use in the classroom, and is studying the processes through which games teach and evaluating the effects of games on student learning. The Social Accounts program is examining how a student's education affects his actual occupational attainment, and how education results in different vocational outcomes for blacks and whites. The Talents and Competencies program is studying the effects of educational experience on a wide range of human talents, competencies and personal dispositions, in order to formulate--and research--important educational goals other than traditional academic achievement. The School Organization program is currently concerned with the effect of student participation in social and educational decision making, the structure of competition and cooperation, formal reward systems, ability-grouping in schools, and effects of school quality. The Careers and Curricula program bases its work upon a theory of career development. It has developed a self-administered vocational guidance device to promote vocational development and to foster satisfying curricular decisions for high school, college, and adult populations.

This report, prepared by the Academic Games program, reviews some practical references in the field, examines the potential of academic games, and offers a selected bibliography of gaming literature.

ABSTRACT

Several recently published books on simulation and games are briefly discussed. Selected research studies and demonstration projects are examined to show the potential of simulation and gaming for teaching and training and for the study of social and psychological processes. The bibliography lists 113 publications which should lead the reader to practical information on games.

The volume of literature on the use of instructional simulations will undoubtedly increase in the near future. Some individuals will be reporting serious research employing the technique, others may be providing practical information on application. A good practical introduction to the design and use of simulation games in the classroom can be found in Simulation Games: An Introduction for the Social Science Teacher by Livingston and Stoll (in press). Two related books are: Games for Growth by Alice K. Gordon (1970) on the educational use of games in the classroom and Simulation Games for the Social Studies Classroom by William Nesbitt (1970). For additional aids in game development, refer to How to Design Educational Games by Ray Glazier (1969). A recent book by Clark C. Abt, entitled Serious Games (1970) has attracted some attention in the discipline for its virtual lack of professional content.

Individuals interested in selecting a particular game for special purposes should consult The Guide to Simulation Games for Education and Training edited by Zuckerman and Horn (1970). The latter book is quite up-to-date and provides detailed descriptions of 400 educational games. And in the area of research with simulation and games, Paul A. Twelker's book Instructional Simulation Systems: An Annotated Bibliography (1969) may eliminate searching through abstracts.

Richard F. Barton's recent book, A Primer on Simulation and Gaming (1970), provides an introduction to this field for persons in the administrative professions, behavioral sciences, and education.

For fundamental knowledge in classical game theory one can turn to Game Theory by Morton Davis (1970), which covers the mathematical theory of games for 2 or more players. Another excellent introduction to game theory can be found in M. Weiner's book War Gaming Methodology (1959).

One can easily keep up with the literature on man-model, man-machine, and machine simulations by subscribing to Simulation and Games: An International Journal of Theory, Design, and Research (1970). This is the only professional journal covering simulation gaming for all purposes. It is edited by staff members of the Academic Games Program at the Johns Hopkins University. Included in each issue are major papers, brief communications, book reviews, simulation reviews, newly available simulations, and news and announcements.

Part II

The Potential of Gaming

A recent definition of gaming was provided by Shubik at a conference on gaming at the Rand Corporation:

> Gaming: A gaming exercise employs human beings acting as themselves or playing simulated roles in an environment which is either actual or is simulated. The players may be experimental subjects whose behavior is being studied, or they may be participants in an exercise being run for teaching, training, or operational purposes.

Nearly all of gaming's potential is reflected in this excerpt. In the following paragraphs, a clarification of this potential will be made by examining selected research and projects. All of the research discussed is subsumed by this definition. Most of the research covered deals with simulation and not classical game theory, which usually involves matrix games with explicit pay-offs for each player. (See Rapoport and Guyer, 1968).

Simulation gaming has been used for teaching and training purposes. However, it is quite difficult to separate the two in classifying research studies. This is probably because of the lack of concern over evaluating the basic aspects of each approach. The use of gaming in the form of military-political exercises has been extensive even without attempts at systematic evaluation through experimentation. Without systematic study in gaming, its evolution as a discipline will be inhibited. The gross nature of gaming in several areas provides rich ground for diverse experimentation which hopefully will result in improvement.

In line with this general discussion of research with simulation games is a recent article by Paul T. McFarlane (in press), "Methodological Advantages of Simulation Games as Social Psychological Research Sites."

McFarlane suggests that most of the research effort to date has been in analyzing the educational (teaching) advantages of simulation games. He believes simulation games are excellent situations for studying social and psychological processes and hopes that more people will become interested in using them in this context. One might see the possibilities for research in this area after considering the advantages he lists: (1) an optimum combination of control and structure versus freedom and innovation with respect to experimenter control of the subjects' actions; (2) a setting more likely to be perceived as "realistic" by the subjects participating in the experiment; and (3) a setting which allows the researcher more information with respect to complex, mutually contingent sequential interactions upon which he can perform his analyses. This certainly reflects gaming's potential. It would be very difficult to find a study to date (except perhaps in research employing matrix games that are usually not considered simulations), that involved blocking on pre-specified social or psychological attributes (other than race, sex, I.Q., or SES) before assignment to selected game treatments. In fact the use of simulation games, as advocated by McFarlane, may provide a valid and useful alternative to strict behaviorally based laboratory research and to ethologically oriented research (that is, research in natural environments) in the study of social psychological phenomena.[1]

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[1]For information on trends toward social psychological research in more natural environments, see an article by William J. McGuire entitled "Theory-Oriented Research in Natural Settings: The Best of Both Worlds for Social Psychology" in Interdisciplinary Relationships in the Social Sciences, edited by Muzafer Sherif and Carolyn W. Sherif, 1969, Aldine Publishing Co., Chicago, Illinois.

An earlier article by Coleman (1968) on games as a medium for social theory adds support to McFarlane's general thesis.

One area of gaming research that is quite active is man-computer simulations. There are two functioning computer-based experimental laboratories carrying out research with man-machine simulations: the System Development Corporation in Santa Monica, California[1] and the POLIS Laboratory at the University of California at Santa Barbara.[2] There are related laboratories at Berkeley, University of Illinois, and Ohio State University. These laboratories can be used for research or training. At the University of Michigan a computerized game has been developed to train education researchers and evaluators by simulating practical experiences. The game is specifically intended to develop skill in the techniques of formative evaluation and heuristic research (FEHR).[3] This utilization of simulated experiences, if proved effective, will undoubtedly be used more often in the near future. A related computer-based model "...for maximizing both the feedback of an administrative simulation exercise and

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[1]A complete description of this laboratory can be found in "A Computer-Based Experimental Laboratory" by Gerald H. Shure and Robert J. Meeker, American Psychologist, Vol. 25, No. 10, October 1970.

[2]This laboratory is described in "The POLIS Laboratory," by Robert C. Noel, The American Behavioral Scientist, July-August, 1969.

[3]"FEHR-PRACTICUM: A computerized game to simulate experience in educational research or evaluation," by LeVerne S. Collet, University of Michigan, 1971, mimeograph copy.

the analysis of the results," was developed at the University of Wisconsin in Madison.[1]

A particularly good example of research with a simple decision-making game was reported by Cohen (1968). It is the first report of a series designed to evaluate "equal status" relationships in integrated settings, and is an application of the principles suggested by McFarlane (in press) for the use of simulation games in social and psychological research. Cohen analyzed the nature of interracial interaction in a game environment and subsequently developed expectation training in an attempt to alter the effects of racial status (see Cohen, et al.,1970 and Lohman, 1970).

Games which are not simulations have also been designed specifically for pedagogical use. The games developed by Layman Allen at the University of Michigan might be called learning games rather than simulation games. For example, WFF 'N PROOF (1969) does not attempt to simulate a social process; its purpose is to enhance certain mental skills--in this case, it attempts to teach players how to improve their skill at logical thinking by forming Well Formed Formulas and Proving them. Thus far, little research has been done with learning games. A related form of gaming,

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[1]"A Computer-Based Feedback Model For Simulation Exercises Involving School Administrators" by Gerald R. Boardman, Final Report, Project No. 8-E-167, October 1, 1969, sponsored by U.S. Department of Health, Education, and Welfare.

perhaps between learning and simulation games, may be found in the development of behavior-based learning systems (BBLS).[1] Development of the latter approach has not received widespread attention, but some information on its effectiveness is available.

Two articles that will improve one's understanding of the use of simulation games in teaching sociology are those by Boocock (1970) and Gamson (in press). These authors emphasize that today's students need to be involved when learning and that social simulation games, which have involvement built in, provide a useful medium for learning.

In the remaining paragraphs, an attempt will be made to suggest an approach for developing a general framework for the optimal use of gaming in training and teaching based on the relationship between the form of the game and the domains of learning as developed by Gagné. (See Education Daily, March 8, 1971 for a brief summary.) The suggested outline is minimal and designed to induce criticism. Gagné believes there are five basic domains of learning: motor skills, verbal information, intellectual skills, cognitive strategies, and attitudes. Shubik (1971) suggested that gaming can be dichotomized into game theory and simulation. Simulation seems most applicable in the area of teaching and training. One usually breaks simulation down into man-model, man-machine, and machine simulation. Learning games like WFF 'N PROOF do not fall within Shubik's classification easily. However, they are a unique form of gaming that

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[1]Developed by Ronald G. Klietsch, Instructional Simulations Inc., 2147 University Avenue, St. Paul, Minnesota 55114.

may effectively develop motor skills, word skills,[1] intellectual skills,[2] or cognitive strategies. In fact, learning games seem to be similar to the games teachers have been using for years that involve simple motivational and competitive structures (such as spelling bee's). With regard to Gagné's hierarchies of learning, the development of cognitive strategies involves definite changes in thinking style and therefore may not be effected with one or two plays of a particular game. In contrast, Gagné states that intellectual skills (which have definite orientations toward one's environment) may be learned quite rapidly. If so, perhaps they could be developed with two or three experiences in well-developed simulations.

Where Gagné shifts from intellectual skills and cognitive skills to attitudes, one might find a parallel shift (for optimal impact) from learning games (structured to increase motivation without role-playing within complex simulated environments), to simulation games and free-form games (military-type operational games). Research, to date, supports the hypothesis that attitudes can be changed by playing social simulation games. Good simulation games represent selected aspects of total environments with human involvement. The increased use of simulation games in attitude change research will also find theoretical support in Gagné's learning domains. Gagné believes it is the "human involvement" during

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[1]See Keislar, E. R., and Phinney, J. "Manipulation and Novelty of Reward as Features in Educational Games." University of California, Los Angeles, August 1970, mimeo.

[2]The games designed by Dr. Ronald Klietsch may be appropriate for improved intellectual skills.

attitude change that distinguishes this type of learning from the other abilities mentioned above. Two recent papers by Kidder (1970, 1971) deal directly with attitude change as a function of the emotional impact of simulation games on the participants.

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